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ABSTRACT

This study is designed to determine whether data obtained cross-sectionally from a sample of subjects in the middle childhood range on selected personality characteristics could be well described by a concave parabolic curve and thus linked to the closure behaviour elicited from the subjects. Specifically, the investigation seeks to determine if the measures of selected personality traits display a parabolic curve similar to that displayed by the initial closure data on the Higgins-Wertman Test of Visual Closure (H-W) over the ages seven, eight, nine and ten years. Initial closure was assessed by the H-W and selected personality traits were assessed by the Children's Personality Questionnaire. Subjects were 20 male and 20 female children at each age level. The initial closure data, over age, was reported by Higgins and Wertman (1968) to form a concave parabolic curve for males and females combined. Results of this study replicate those findings. (Author)

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An Investigation of the Relation Between the Developmental Parabolic Curve and Selected Personality Variables

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Background

The phenomenon of the dropping or leveling out in developmental measures of children during the middle childhood range has been noted in many areas, and has been labeled the concave parabolic curve phenomenon because of the form which such developmental data take when plotted by age. Previous researchers have linked, conceptually and empirically, a variety of personality and behavioral measures under such labels as "closure", "risk-taking", "impulsivity-reflectively", "creativity", "fast decider-slow decider" and so on (Thurstone, 1944; Pemberton, 1952; Kogan and Wallach, 1964; Kagan, 1965; Block and Peterson, 1955; Torrance, 1962, 1969; Higgins and Wertman, 1968). This study was designed to determine whether data obtained cross-sectionally from a sample of subjects in the middle childhood range on selected personality characteristics would be well described by a concave parabolic curve and thus linked to the closure behavior elicited from the subjects.

The concave parabolic has been found to describe both longitudinal data (Torrance, 1969) and cross-sectional data (Kirkpatrick, 1900; Boland, 1910; Simpson, 1922; Torrance, 1969; Higgins and Wertman, 1968). Data on children's responses to inkblots (Kirkpatrick, 1900), on dare-taking (Boland, 1910), on creative imagination (Simpson, 1922) and on creativity (Torrance, 1962, 1969) have all been described by a concave parabolic curve when graphed.

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Most recently, this phenomenon was exhibited in the normative data of the mean initial closure scores on the Higgin-Wertman Test of Visual Closure (Higgins and Wertman, 1968) over the ages five through fifteen years. The low point of the curve occurred at age nine years. This test requires that the subject identify a picture of a familiar but impoverished figure. Each figure (scale) is composed of several cards. Each successive card provides more pictorial cues until the figure is complete with the presentation of the final card. The cards are numbered in descending order.

The Higgins-Wertman Test provides two measures of visual closure, initial closure and final closure. Initial closure is defined in the manual as ". . . that point on the scale at which the subject first verbally labels the picture, whether or not the response is correct." A subject with a high initial closure score would verbally label the figure sooner than a subject with a low initial closure score. Final closure is defined in the manual as ". . . that point on the scale at which the subject correctly labels the symbol." The authors have proposed that initial closure (i.e., the concave parabolic curve) may be related to the affective domain; i.e., personality and final closure may be related to the cognitive domain (Higgins and Wertman, 1968).

The latter notion has been supported in a study by Rusch (1970). The initial closure scores achieved very low correlation with the cognitive factors utilized in the study (Rusch, 1970), leaving open the speculation that initial closure behavior, and therefore, the concave parabolic curve may be related to personality.

The intent of the study was to investigate the relationship between the concave parabolic curve as exhibited by the normative initial closure scores on the Higgins-Wertman Test of Visual Closure and selected personality characteristics of children. The parabolic curve for initial closure as described by Higgins and Wertman (1968) was found for ages 5 through 15 years with the lowest level appearing at age 9 years. Since the dropping effect happened over the middle childhood range, the present study was concerned with these variables at ages 7, 8, 9 and 10 years, respectively.

Method and Sample

Specifically, the question investigated was: do the measures of selected personality traits display a quadratic trend (i.e., a parabolic curve) similar to that displayed by the initial closure data on the Higgins-Wertman Test of Visual Closure over the ages seven, eight, nine and ten years.

Initial closure was assessed by the Higgins-Wertman Test of Visual Closure (Higgins and Wertman, 1968). The selected personality traits were assessed by the Children's Personality Questionnaire (Porter and Cattell, 1968). The Children's Personality Questionnaire provides a measure of fourteen first order personality factors and two main second order personality factors. The first order personality factors are observable descriptive characteristics and corresponded to an operational definition of personality in this study.

To answer the question concerning the presence of a quadratic trend (i.e., parabolic curve) in the measures of the selected

personality variables, univariate quadratic trend analyses were applied to the mean data. The quadratic trend analyses were performed utilizing the method of orthogonal contrasts (Senedecor and Cochran, 1967) with the four equally spaced levels of the independent variable being the age levels of the subjects.

Those children in an upstate New York school district whose ages were within 3 months of seven, eight, nine and ten years served as the population for this study. A sample of twenty male and twenty female subjects at each age level (N=160) was chosen from the population by utilizing a table of random numbers. Their age level categories (seven years ± three months, eight years ± three months, nine years ± three months and ten years ± three months) were chosen to correspond to the normative sample of the Higgins-Wertman Test of Visual Closure.

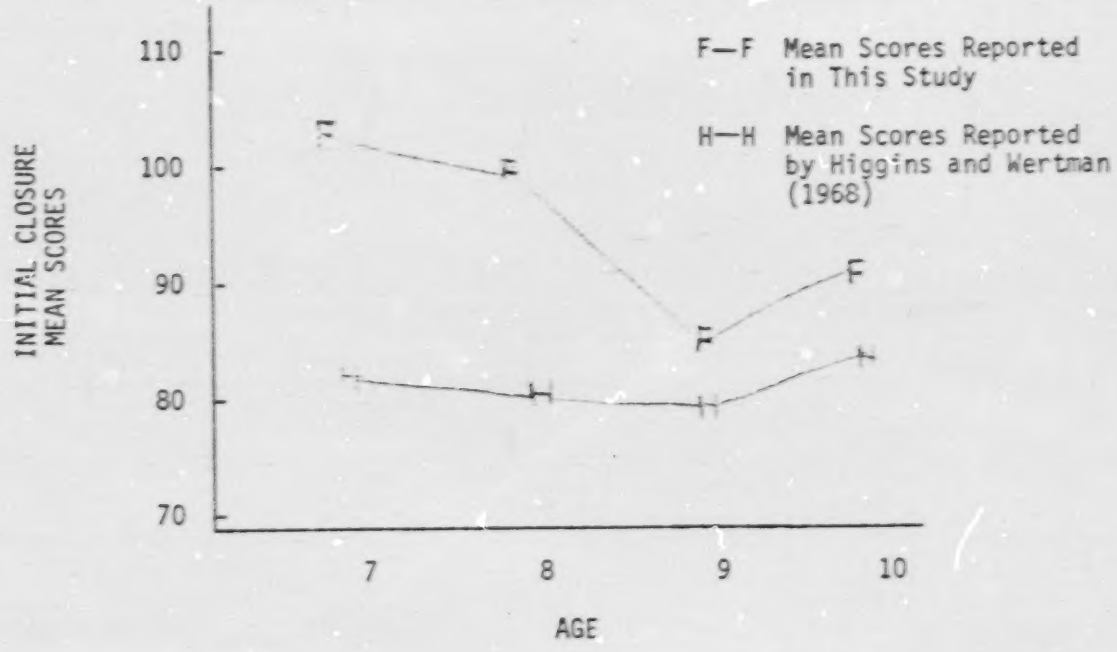
Results

The initial closure data over age was reported by Higgins and Wertman (1968) to form a concave parabolic curve for males and females combined. This finding was replicated in this study. For boys and girls, as well as for both sexes combined, over the ages seven through ten years, the curve was even more pronounced than that presented by Higgins and Wertman (1968). The low point occurred at age nine years. The mean scores for boys and girls ages 7, 8, 9 and 10 years were 104.2750, 102.0000, 84.1500 and 96.1500, respectively. The mean scores reported by Higgins and Wertman (1968) for these age levels were 81.87, 81.26, 79.58, and 83.66, respectively. A graph of both curves average levels 7, 8, 9 and 10 years is presented in Figure 1. The concave parabolic curve representing the initial

closure data for this study is more defined than the concave parabolic curve representing the normative initial closure data on the Higgins-Wertman Test of Visual Closure for these ages.

Figure 1

Graph of Mean Initial Closure Scores (Combined Sex) as Reported by Higgins and Wertman (1968) and this study

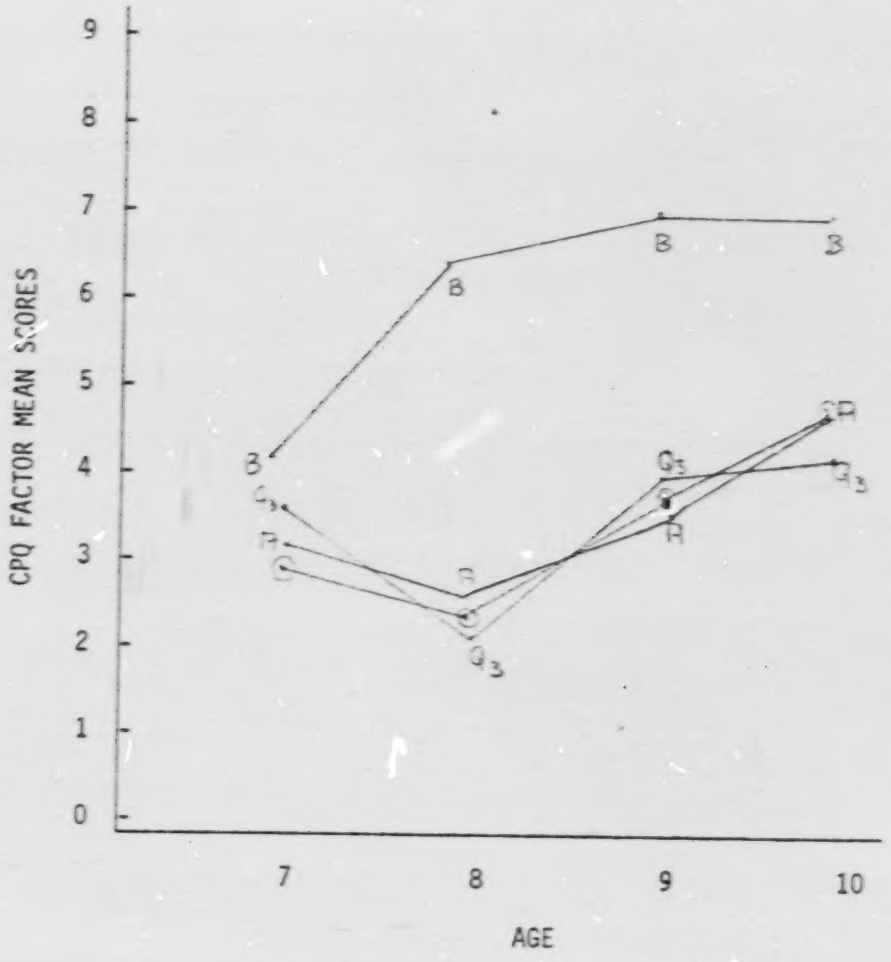


To determine whether the concave parabolic curve described the mean scores of the first order factors on the Children's Personality Questionnaire, a univariate quadratic trend analyses was applied to the means scores. First Order Factors A (warmhearted vs. reserved), B (concrete thinking vs. abstract thinking), O (self-assured vs. apprehensive) and Q_3 (casual vs. controlled) were described by a parabolic curve for males and females combined. (See Figure 2).

Figure 2

CPQ Factors Presenting Parabolic Curves When the Mean Scores (Combined Sex) Are Plotted With CPQ Factors A and Q_3 Reflected

			High Score	to	Low Score
A	A	CPQ A	warmhearted	to	reserved
B	B	CPQ B	abstract thinking	to	concrete thinking
Q_3	Q_3	CPQ Q_3	controlled	to	casual
O^3	O^3	CQP O^3	apprehensive	to	self-assured



The quadratic trends displayed by these four factors were significant at the .05 level (F ratio).

Developmentally, in this sample over the four age levels (7, 8, 9 and 10 years), the data in Figure 3 indicate that the groups changed

from being warmhearted (CPQ Factor A), controlled (CPQ Factor Q_3) and apprehensive (CPQ Factor O) to being reserved (CPQ Factor A), casual (CPQ Factor Q_3) and self-assured (CPQ Factor O); then they become more warmhearted (CPQ Factor A), more controlled (CPQ Factor Q_3) and more apprehensive (CPQ Factor O). For both sexes combined, the data in Figure 2 indicate that over the four age levels the subjects change from concrete thinking to more abstract thinking. This finding is consistent with other developmental research data (Piaget and Inhelder, 1969).

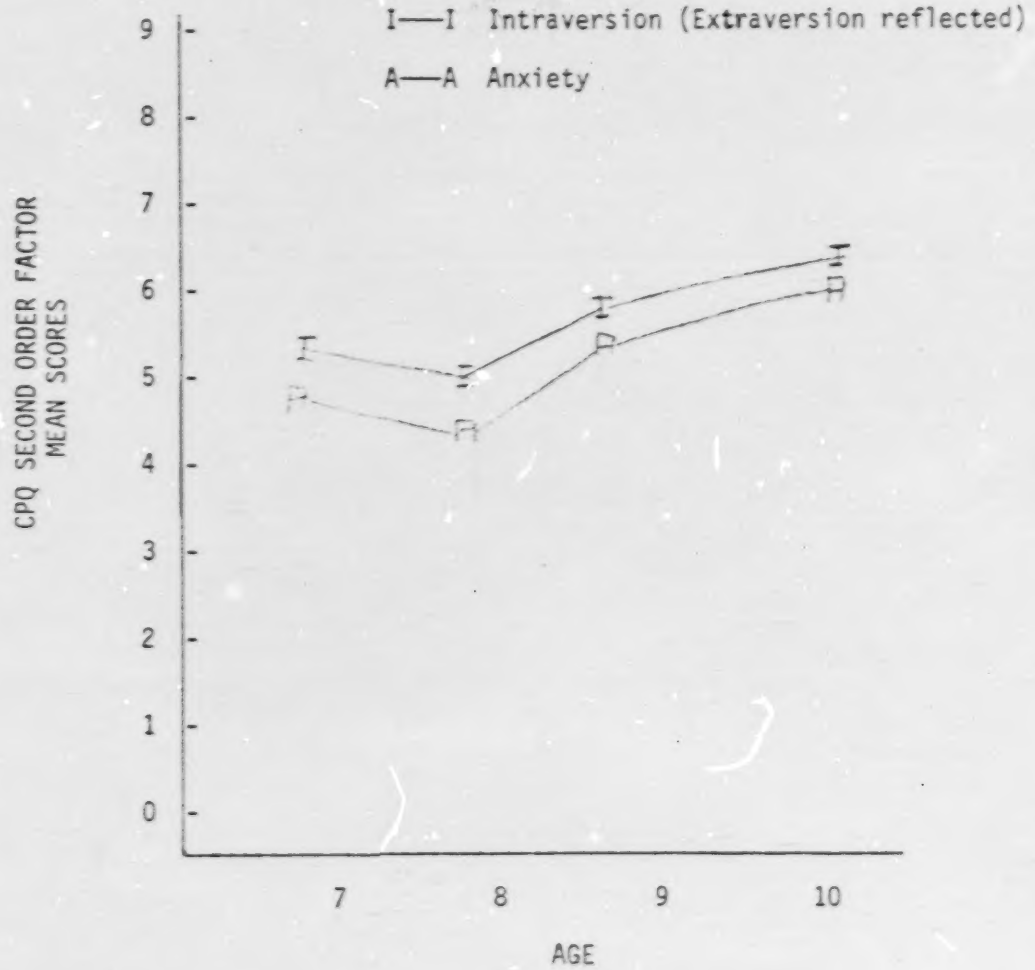
Because of the relatively high inter-correlations among the fourteen selected personality variables on the CPQ (Porter and Cattell, 1968) and the fact that only Form A of the CPQ was implemented in this study, (the authors advise using both Forms A and B to insure test score stability), the more stable Second Order test factors were also investigated for the presence of a quadratic trend in the data. It was felt that the investigation of the Second Order Factors would lead to a more parsimonious interpretation of the data results. The Second Order Factors investigated were Anxiety and Extraversion-Intraversion (Porter and Cattell, 1968). These factors are presented as the main second stratum factors for the Children's Personality Questionnaire by Porter and Cattell (1968).

The results of the quadratic trend analysis of the Second Order Factors is presented in Table 2. For both sexes combined, over the four age levels, both Anxiety and Extraversion displayed quadratic trends with an F-ratio significant at the .05 level. The mean scores for both sexes combined for the Anxiety Factor for ages 7, 8, 9 and

10 years were 4.94, 4.57, 5.65 and 6.15, respectively. The mean scores for both sexes combined for the Extraversion Factor for these age levels were 5.61, 5.91, 5.74 and 5.30, respectively. A plot of the data mean scores for the Anxiety Factor and the Extraversion Factor are presented in Figure 3.

Figure 3

CPQ Second Order Factors Presenting Quadratic Trends When the Mean Scores (Combined Sex) Are Plotted Where the Extraversion Factor is Reflected



Developmentally, in this sample, the data in Figure 3 indicate that the minimum point for the quadratic trend for Anxiety occurs at the 8 year age level. The graph would indicate that over the 4 age levels tested, anxiety is a decreasing and then an increasing function. A subject scoring low on the anxiety factor has been described as phlegmatic, composed, unshakable, trustful, adaptable, mature, calm and self-sufficient. A subject scoring high on the anxiety factor has been described as tense, excitable, insecure, suspecting, jealous, emotional, unstable, lax and unsure (Cattell, 1965; Porter and Cattell, 1968). As indicated by the measures utilized in this study, anxiety is on the rise for ages 9 and 10 years.

If the quadratic curve representing Extraversion is reflected and interpreted as Intraversion, the minimum point for the quadratic trend occurs at age level 8 years. Developmentally, in this sample, the data in Figure 3 indicate that over the 4 age levels tested, intraversion is a decreasing and then an increasing function. A subject scoring high on the intraversion factor has been described as aloof, cold, glum, silent, timid, shy, unconcerned and resourceful. A subject scoring low on the intraversion factor has been described as warm, sociable, enthusiastic, talkative, adventurous, thick-skinned, conventional, practical and imitative. (Cattell, 1965; Porter and Cattell, 1968;).

If one examines the complete concave parabolic curve presented by the normative initial closure scores on the Higgins-Wertman Test of Visual Closure, one can see that at 7 years the curve is decreasing and approaching its minimum point -- which is at age 9 years.

Discussion

The finding that a quadratic trend represented four First Order Factors and both Second Order Factors of the Children's Personality Questionnaire, as well as initial closure, lend support to the notion advanced by Higgins and Wertman (1968) that initial closure may be a function of the affective, rather than the cognitive domain, i.e., that initial closure may be a function of the personality traits of the subjects.

The minimum points for anxiety, intraversion and initial closure are within the age range reported by others (Kirkpatrick, 1900; Boland, 1910; Simpson, 1922; Torrance, 1962, 1969; Higgins and Wertman, 1968). However, the minimum points for Anxiety and Intraversion both occur at age eight, while the minimum point for initial closure is at age nine. It has been suggested that such a time lag in the trends of developmental data occur because the development of one variable depends upon the previous development of the other variable(s) (Wohlwill, 1970). If this situation is a case in point, then the initial closure scores (when interpreted as a measure of the subject's willingness to respond) might be dependent upon the previous development of Anxiety and Intraversion in the subject. Keeping in mind that the cards are numbered in decreasing order, the longer a subject waits to name a card, the lower will be his initial closure score. Perhaps Anxiety and Intraversion have to be at a low point before the subject can feel free to withhold his response resulting in a low initial closure score.

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